

## PATENT ABSTRACTS OF JAPAN

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(22)Date of filing : 18.02.1994

(72)Inventor : TAKAHASHI HIRONORI

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### (54) SLIDING CONTACT MATERIAL

#### (57)Abstract:

PURPOSE: To obtain a sliding contact material, free from Cd causing fear of environmental pollution, having low and stable contact resistance, remarkably reduced in wear loss, and having extremely long service life, by adding specific amounts of Si to Ag.

CONSTITUTION: Si or Sm is added by 0.05-5% by weight to Ag or AgCu alloy where Cu is added, if necessary, by <12%, preferably 4-10%. This Si or Sm has eutectic structure with respect to Ag or AgCu alloy and is dispersed finely and uniformly. This Si or Sm forms fine oxide in a sliding surface by means of heat due to sliding. The oxide of Si or Sm exerts a slight-degree grinding action and always produces wear particle, and this wear particle is subjected to rolling wear and reduces sliding wear. By this method, the long life sliding contact material can be obtained.

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L20: Entry 4 of 7

File: DWPI

Aug 29, 1995

DERWENT-ACC-NO: 1995-332803  
DERWENT-WEEK: 199543  
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TITLE: Sliding contact material - comprises silver@ alloy contg silicon@, providing low stable contact resistance

## PATENT-ASSIGNEE:

ASSIGNEE

CODE

TANAKA KIKINZOKU KOGYO KK

TANI

PRIORITY-DATA: 1994JP-0044806 (February 18, 1994)



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ABSTRACTED-PUB-NO: JP 07228931A

## BASIC-ABSTRACT:

Sliding contact material contains Ag with 0.05-5 wt.% Si.

ADVANTAGE - No Cd is used while maintaining low and stable contact resistance, and a low abrasion.

CHOSEN-DRAWING: Dwg.0/0

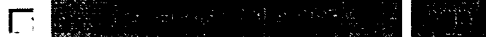
TITLE-TERMS: SLIDE CONTACT MATERIAL COMPRISE SILVER@ ALLOY CONTAIN SILICON@ LOW STABILISED CONTACT RESISTANCE

DERWENT-CLASS: L03 M26 V04 X12

CPI-CODES: L03-A01A1; L03-A01A4; M26-B01; M26-B01S;

EPI-CODES: V04-L01; X12-D01A;

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File: JPAB

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PUB-NO: JP407228931A

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TITLE: SLIDING CONTACT MATERIAL

PUBN-DATE: August 29, 1995

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APPL-NO: JP06044806

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## ABSTRACT:

PURPOSE: To obtain a sliding contact material, free from Cd causing fear of environmental pollution, having low and stable contact resistance, remarkably reduced in wear loss, and having extremely long service life, by adding specific amounts of Si to Ag.

CONSTITUTION: Si or Sm is added by 0.05-5% by weight to Ag or AgCu alloy where Cu is added, if necessary, by <12%, preferably 4-10%. This Si or Sm has eutectic structure with respect to Ag or AgCu alloy and is dispersed finely and uniformly. This Si or Sm forms fine oxide in a sliding surface by means of heat due to sliding. The oxide of Si or Sm exerts a slight-degree grinding action and always produces wear particle, and this wear particle is subjected to rolling wear and reduces sliding wear. By this method, the long life sliding contact material can be obtained.

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(54) 【発明の名称】 摺動接点材料

(57) 【要約】

【目的】 生産上、使用上、環境汚染、公害が懸念されるCdが入らず、接触抵抗が、低く安定していて、摩耗量が著しく、寿命が極めて長い摺動接点材料を提供する。

【構成】 Ag又はCuを12wt%未満含有するAgCu合金に、Si又はSmを0.05~5wt%添加してなる摺動接点材料。

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## 【特許請求の範囲】

【請求項1】 Agに、Siを0.05～5wt%添加してなる摺動接点材料。

【請求項2】 Agに、Smを0.05～5wt%添加してなる摺動接点材料。

【請求項3】 Agに、Cuを12wt%未満とSiを0.05～5wt%とを添加してなる摺動接点材料。

【請求項4】 Agに、Cuを12wt%未満とSmを0.05～5wt%とを添加してなる摺動接点材料。

【請求項5】 前記Cuの添加が4～10wt%である請求項3又は請求項4記載の摺動接点材料。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、摺動接点材料に係り、特にマイクロモータの整流子に適する摺動接点材料に関する。

## 【0002】

【従来の技術】従来、マイクロモータの整流子には、Ag-Cd 1wt%、Ag-Cu 6wt%-Cd 2wt%の摺動接点材料が用いられてきた。ところが近時、Cd入りの摺動接点材料は、生産上、使用上、環境汚染、公害等が懸念される問題があって、Cdの入らない摺動接点材料が要望されている。また、Cd入りの摺動接点材料は、マイクロモータの整流子に用いた場合、耐摩耗性が不十分で、寿命が短い。

## 【0003】

【発明が解決しようとする課題】そこで本発明は、Cdが入らず、耐摩耗性に優れた摺動接点材料を提供しようとするものである。

## 【0004】

【課題を解決するための手段】上記課題を解決するための本発明の摺動接点材料の1つは、Agに、Siを0.05～5wt%添加してなるものである。本発明の摺動接点材料の他の1つは、Agに、Smを0.05～5wt%添加してなるものである。本発明の摺動接点材料のさらに他の一つは、Agに、Cuを12wt%未満とSiを0.05～5wt%とを添加してなるものである。本発明の摺動接点材料のさらに他の一つは、Agに、Cuを12wt%未満とSmを0.05～5wt%とを添加してなるものである。上記摺動接点材料に於いて、SiやSmを0.05～5wt%添加する理由は、摺動摩耗を低減するためで、0.05wt%未満ではその効果が無く、5wt%を超えると加工性が悪くなり、圧延加工ができなくなるからである。また、上記摺動接点材料に於いて、Cuを12wt%未満添加する理由は、硬さを向上し耐摩耗性を備えるためで12wt%以上では接触抵抗が高く、不安定になるからである。AgCu合金において特に好ましくはCu 4wt%～10wt%である。

## 【0005】

【作用】上記本発明の各摺動接点材料は、Ag又はAgCu合金に対して共晶組織を有し、微細且つ均一なSi

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やSmが分散せしめられているので、摺動による熱によりSiやSmの微細な酸化物が摺動面に生成され、これが微研摩作用し、常に微細な摩耗粉を発生させる結果、この摩耗粉がころがり摩耗し、摺動摩耗を低減するので、耐摩耗性が備わる。

## 【0006】

【実施例】本発明の各摺動接点材料の実施例と従来例について説明する。下記の表1の左軸に示す成分組成の実施例1～12の配材及び従来例1～5の配材を各1Kgを溶解し、板材に鋳造した。次にこの板材を面削し、焼鈍した後、圧延し、さらに温度600～700℃、H<sub>2</sub>+N<sub>2</sub>雰囲気中で30分焼鈍した。次いで酸洗し、圧延して厚さ0.5mm、幅50mmの帯状の摺動接点材料を得た。これら摺動接点材料にて、直径6mm、長さ10mmの整流子の外周に、接点片を形成し、この接点片の外周面の上下に、Ag-Pd 50wt%よりなる直径1mm、長さ8mmの3本の刷子線材を有する刷子接点を相対向するように摺接させて、次の試験条件にて整流子の回転試験を行い、接点片の接触抵抗と摩耗量及び寿命を測定した。下記の表1の右欄に示すような結果を得た。

## 試験条件

電 流	DC 150mA
電 圧	13V
整流子の回転数	2400rpm
整流子の回転時間	5000時間
刷子接点の接触力	20g/3本

## 【0007】

## 【表1】

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	成分組成 (wt%)					接触抵抗 (mΩ)	摩耗量 (μm)
	Ag	Cu	Cd	Si	Sm		
実施例1	残	-	-	0.5	-	2	3.5
実施例2	残	-	-	1	-	3	3.2
実施例3	残	-	-	-	0.5	2	3.4
実施例4	残	-	-	-	2	4	3.1
実施例5	残	4	-	0.5	-	5	2.8
実施例6	残	10	-	1	-	10	2.1
実施例7	残	4	-	-	0.5	6	2.5
実施例8	残	10	-	-	2	12	2.0
実施例9	残	-	-	5	-	8	3.0
実施例10	残	-	-	-	5	7	2.8
実施例11	残	7.5	-	0.1	-	7	3.0
実施例12	残	7.5	-	-	0.1	8	2.8
従来例1	残	-	-	-	-	10	6
従来例2	残	4	-	-	-	14	5
従来例3	残	10	-	-	-	15	4
従来例4	残	-	1	-	-	13	6
従来例5	残	6	2	-	-	18	5

【0008】上記の表1の右欄に示す結果で明らかなように実施例1～12の摺動接点材料にて形成した整流子外周の接触片は、従来例1～5の摺動接点材料にて形成した整流子外周の接触片よりも接触抵抗が低く安定し、また摩耗量が著しく少ないことが判る。

【0009】

【発明の効果】以上の通り本発明の各摺動接点材料は、生産上、使用上、環境汚染、公害が懸念されるCdが入らず、接触抵抗が低く安定していて、摩耗量が著しく少なく、寿命が極めて長いので、従来の摺動接点材料にとって代わることができる。

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the sliding-contacts ingredient which is applied to a sliding-contacts ingredient, especially fits the commutator of a micro motor.

[0002]

[Description of the Prior Art] Conventionally, the sliding-contacts ingredient (Ag-Cd 1wt% and Ag-Cu 6wt%-Cd 2wt%) has been used for the commutator of a micro motor. However, recently, the sliding-contacts ingredient containing Cd has the problem on which we are anxious about environmental pollution, a public nuisance, etc. on production and use, and the sliding-contacts ingredient into which Cd does not go is demanded. Moreover, when it uses for the commutator of a micro motor, the sliding-contacts ingredient containing Cd has inadequate abrasion resistance, and its life is short.

[0003]

[Problem(s) to be Solved by the Invention] Then, Cd does not tend to enter but this invention tends to offer the sliding-contacts ingredient excellent in abrasion resistance.

[0004]

[Means for Solving the Problem] one of the sliding-contacts ingredients of this invention for solving the above-mentioned technical problem -- Ag -- Si -- 0.05 - 5wt% -- it comes to add. other one of the sliding-contacts ingredients of this invention -- Ag -- Sm -- 0.05 - 5wt% -- it comes to add. One of the sliding-contacts ingredients of this invention of further others comes to add less than [ 12wt% ] and Si 0.05 - 5wt% for Cu to Ag. One of the sliding-contacts ingredients of this invention of further others comes to add less than [ 12wt% ] and Sm 0.05 - 5wt% for Cu to Ag. the above-mentioned sliding-contacts ingredient -- setting -- Si and Sm -- 0.05 - 5wt% -- the reason to add is for reducing sliding wear, and is because workability worsens and strip processing becomes impossible less than [ 0.05wt% ], when the effectiveness does not exist and 5wt% is exceeded. moreover, the above-mentioned sliding-contacts ingredient -- setting -- Cu -- less than [ 12wt% ] -- it is for improving hardness and having abrasion resistance, and the reason to add has high contact resistance at more than 12wt%, and is because it becomes unstable. In an AgCu alloy, it is Cu 4wt% - 10wt% especially preferably.

[0005]

[Function] Since this wear powder is rolled and worn out and each sliding-contacts ingredient of above-mentioned this invention reduces sliding wear as a result of the detailed oxide of Si or Sm being generated by the sliding surface with the heat by sliding, and this carrying out fine scouring and generating always detailed wear powder, since it has eutectic structure to Ag or an AgCu alloy and detailed and uniform Si and Sm are made to distribute, it is equipped with abrasion resistance.

[0006]

[Example] The example and the conventional example of each sliding-contacts ingredient of this invention are explained. It dissolved 1kg each and the \*\* material of the examples 1-12 of the component presentation shown in the left axis of the following table 1 and the \*\* material of the



conventional examples 1-5 were cast to the plate. Next, after carrying out facing of this plate and annealing it, it rolls out, and they are 600 to 700 degree C temperature, and H<sub>2</sub>+N<sub>2</sub> further. It annealed in the ambient atmosphere for 30 minutes. Subsequently, it pickles and rolls out and is thickness. The band-like sliding-contacts ingredient (0.5mm and width-of-face 50mm) was obtained. With these sliding-contacts ingredient, on the periphery of a commutator with a diameter [ of 6mm ], and a die length of 10mm The piece of a contact is formed. The diameter of 1mm of the peripheral face of this piece of a contact which consists of Ag-Pd50wt% up and down, It was made to \*\*\*\* so that phase opposite of the brush contact which has three brush wire rods with a die length of 8mm may be carried out, the drum test of a commutator was performed in the following test condition, and the result as shown in the right column of the place which measured the contact resistance, the abrasion loss, and the life of the piece of a contact, and the following table 1 was obtained.

\*\*\*\*\* Style DC 150mA \*\* \*\* Rotational frequency of 13V commutator Turnover time of a 2400rpm commutator Contact force of a 5000-hour brush contact 20g / 3 [0007]

[Table 1]

	成分組成 (wt%)					接触抵抗 (mΩ)	摩耗量 (μm)
	Ag	Cu	Cd	Si	Sn		
実施例 1	残		-	0.5	-	2	3.5
実施例 2	残	-		1	-	3	3.2
実施例 3	残	-	-	-	0.5	2	3.4
実施例 4	残	-	-	-	2	4	3.1
実施例 5	残	4	-	0.5		5	2.8
実施例 6	残	10	-	1		10	2.1
実施例 7	残	4	-	-	0.5	8	2.5
実施例 8	残	10	-	-	2	12	2.0
実施例 9	残	-	-	5	-	8	3.0
実施例 10	残	-	-	-	5	7	2.8
実施例 11	残	7.5	-	0.1	-	7	3.0
実施例 12	残	7.5	-	-	0.1	8	2.6
従来例 1	残	-	-		-	10	6
従来例 2	残	4	-	-		14	5
従来例 3	残	10	-	-	-	15	4
従来例 4	残		1	-	-	13	6
従来例 5	残	6	2	-	-	18	5

[0008] Contact resistance is low stabilized by the contact segment of the commutator periphery formed with the sliding-contacts ingredient of examples 1-12 by the result shown in the right column of the above-mentioned table 1 so that clearly rather than the contact segment of the commutator periphery formed with the sliding-contacts ingredient of the conventional examples 1-5, and it is understood that there is little abrasion loss remarkably.

[0009]

[Effect of the Invention] As above, since Cd which is anxious about environmental pollution and a public nuisance did not enter on production and use, but contact resistance is low stable, there is little abrasion loss remarkably and the life is very long, each sliding-contacts ingredient of this invention can be replaced for the conventional sliding-contacts ingredient.

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[Translation done.]